



SISPRO : Research and Development on the seismic effects attenuation with depth for the seismic design of a long term nuclear waste disposal in the subsurface domain

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In the framework of the 1991/12/30 french law on the management of the nuclear industry waste, the French Atomic Energy Commission (C.E.A.) studies potential benefits against seismic risk of the subsurface domain for the design of an interim storage installation. Indeed, few damage has been observed on subsurface structures during large earthquakes which implied major destructive effects on surface buildings, as during the 1995 Kobe earthquake. However, knowledge on seismic design for subsurface facilities is mainly based on empirical know-how, without satisfactory scientific background which could allow characterization of any given site seismic wave attenuation with depth. The SISPRO program intends to fulfill this lack with two complementary research axis : data acquisition and analysis at several depths and in/on mountain topographies on one hand, accurate numerical modeling on the other hand. The latter will be useful for the establishment of a methodology able to predict seismic waves amplitude, depending on the geotechnical site characteristics and depth. Data analysis which has already been made, such as attenuation laws with several sites data and depth as a parameter, will be depicted. Numerical modeling is based on a 3D finite differences method able to carry computation of synthetics in any kind of geology. A specific research program is devoted to the case when a topography is present. Numerical results show an attenuation which is smaller than the observed one. This implies that the introduction of a strong gradient in the surface layers properties is probably necessary. Perspectives of the SISPRO program until 2006 will be presented, such as strong motion modeling and how to take into account soil-structure interaction.